

The present invention is directed to a sensor fusion system for simultaneously sensing thermally emitted radiation and reflected radiation in the visible NIR/SWIR from the same view and fusing these sensed images to provide important visual information to an observer. As discussed in the specification, this simultaneous sensing is carried out by directing the received thermal and reflected radiation through a single objective lens so that all sensed radiation originates along exactly the same optical path. The received images are then directed, by a beamsplitter, to respective sensors. The system thus provides precise co-registration of the received reflective and thermal infrared images, regardless of the depth-of-field range of the scene being imaged, to enable precise integration of the images.

The claims in the present application have been rejected over Patent No. 6,222,187 to Shivanandan, claim 1 under 35USC§102, and claims 2-5 under 35USC§103.



The '187 patent is directed to a multiwavelength imaging and spectroscopic photomission microscope system, in which a microscope includes a number of visible and infrared spectra objective lenses 122, mounted on a turret assembly 120. Light passes through the objective lenses and through a grating spectrometer 106, where grating 154 separates the light according to wavelength. The separated wavelengths are then directed to beam splitter 108. The spectrometer 106 divides the light into three bands, 200 nm



to 600 nm (ultraviolet), 600 nm - 1000 nm (visible), and 1000 nm to 2500 nm (infrared).

A fundamental difference between the present invention and the '187 patent is that the patent defines the term "infrared" as including the spectrum of 1000 nm to 2500 nm (see Col 1, lines 22-23 and Col 4, line 9). However, this is the emissive infrared spectrum. The present application, on the other hand, is directed to, and claims, the sensing of radiation in the thermal infrared spectrum of 3-15 microns, which is 3000 to 15000 nm. Thus, the present invention is directed to a system for accurately detecting and co-registering images in a subspectrum of visible/NIR/SWIR radiation and a subspectrum of thermal IR, and this is not taught in the prior art, and more particularly is not taught in the '187 patent.

In addition, it is respectfully pointed out that the optical system described and claimed in the present application is distinct from the system taught by the '187 patent. More particularly, the present application discloses and claims (see claim 1) a microscope having "a single focusing objective lens for receiving radiation from a scene." This structure is described, for example, in paragraph [0029] of the present application. In contrast, the '187 patent describes the microscope 102 as including a turret assembly 120 of visible and infrared objective lenses 122. The patent thus fails to teach or to recognize this single lens feature of the present invention, but instead teaches away from the



present claims by requiring multiple lenses. According to the '187 patent, multiple objective lenses are provided to receive different radiation spectra, and such a teaching cannot suggest or make obvious applicants' discovery of a single-lens system which enables accurate co-registration of different spectra.

Claim 1 is said in the Office Action to be "anticipated" by the '187 patent. However, it is well established that in order for a reference to anticipate a claim, each and every element of the claim must be found in that reference. This is not the situation in the present application, and it is clear that the claim is not anticipated.

In the rejection, it is asserted that the '187 patent shows all of the elements of claim 1. However, the Office Action does not list all the elements of claim 1 in attempting to read the claim or the reference, so as a result, the rejection is not directed to the actual claim language of the present application, and cannot be maintained. For example, the '187 reference is said to show "a focusing objective lens (element 122)." First of all, claim 1 actually is directed to "a single focusing objective lens", not to the structure recited in the Office Action, so the rejection is not directed to the claimed invention. Secondly, the reference does not show "a" lens 122, it discloses "a turret assembly 120 of ... objective lenses 122" (emphasis added), so the reference itself does not support the rejection.

Other differences between the rejected claim and the actual claim also are evident. For example, the Office Action says that the '187 patent includes a beamsplitter for receiving the radiation, but this is not what applicants claim. Instead, claim 1 states that the beamsplitter receives radiation "from said objective lens". The reference does not disclose this; instead, the light from the lenses 122 is directed to a grating spectrometer 106 in the '187 patent, and this structure cannot anticipate the claim. As another example, claim 1 defines a subspectrum of thermal radiation in the 3-15 micron region, and this is not mentioned in the rejection, or in the reference.

Clearly, therefore, the rejection under 35USC102 cannot stand.

It is respectfully submitted that claim 1 is not obvious over the '187 reference, for nothing in that reference suggests that incoming radiation could or should be directed through a single objective lens. The '187 reference does not recognize that by directing light through multiple lenses, registration problems are produced, nor does it teach applicants' solution, as defined in claim 1. As set out in the present application, applicants' use of a single objective lens solves the co-registration problem of the prior art in a unique, novel and patentably distinct way.

Claims 2-5 are rejected as being obvious over the '87 reference. However, these claims are all dependant on claim 1 and distinguish over the reference for the reasons discussed above. None of the assertions of

obviousness in the Office Action overcome the fundamental distinction between the present invention and the '187 reference, and accordingly it is respectfully submitted that these claims are also clearly patentable.

In view of the foregoing, it is respectfully submitted that the claims now in the application are clearly patentable, and favorable reconsideration is solicited.

Respectfully submitted,
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MARKED-UP VERSION OF CLAIMS

- - 3. (Amended) A sensor apparatus describe in claim 2, where the composite signal output is connected to a display device. - -